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ABSTRACT

Climbing walls can be designed to satisfy the needs of both untrained and experienced climbers offering these people a place to learn their craft as well as a place for them to keep their skills honed during off seasons. Users of the artificial wall can be classified into special groups, such as "Youth at Risk," who are engaged in challenge/growth programs; recreational climbers who wish to gain or sharpen their skills; and instructors-in-training whose goal is to work with the previously mentioned groups. When designing a climbing wall two goals should be considered: the wall should allow most average balance climbers to reach the top and provide realistic climbing problems like those of real rock cliffs. Based on these two goals, the Unity College in Maine designed and built such a wall with $1,000 and volunteered labor. The wall is three dimensional with sloping overhangs, corners and many color-coded mounted handholds. To minimize space, the wall folds up and is protected by closing safety doors. Handhold locations duplicate real situations encountered in the field. Thus, novice climbers use a specific color set of handholds that satisfy their needs and later progress to other color-codes requiring greater skill. (PM)

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by Jerry Cinnamon,

Unity College in Maine

March 85

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'She knew it was the crux. The quivering had come as the accumulated strain of standing in balance on one foot started to take effect. It grew into a tremble - a vibration that set whole leg shaking, threating to throw her off the wall. With a reserve of energy, that she never before summoned up, she willed her leg still, and tried to unlock the problem ahead. Facing her was a unique combination of mind-teasing puzzle and gripping challenge that had come as she neared the limit of her physical abilities.....'

The reader can conjur up an image of an experienced climber committed on an exposed rock face hundreds of feet above the talus and see the drama in the scene above, but this is not the setting. Instead, the climber is a novice poised a few feet off the ground on an artificial climbing wall. To her the drama is real and the emotional challange paramount. Her physical and problem solving abilities are untrained. She may graduate to the cliffs and mountains as a recreational climber, or this may be her one climbing experience. Today, many hundreds if not thousands of individuals are undergoing similar experiences as the number of artificial climbing walls in the U.S. increases. This increase accompanies the explosive interest in climbing that has occurred in the late 1960's and 1970's. Although climbing walls are well known in Great Britian, the number of climbing walls in the U.S., their location, type of construction, and philosophy of use remains unchartered. This article will look at aspects of climbing wall use and design as a logical outcome of the types of groups and individuals using them.

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Goals of Climbing Wall Design

Climbing walls are often used by distinctive groups with their own reasons for using the walls and their own needs. Common to these needs is the need for challange.. One of these groups includes individuals belonging to special groups, such as 'Youth at Risk' engaged in challange/growth types of programs. A second group is that of recreation climbers seeking to gain or sharpen their personal skills while keeping physically fit in periods of bad weather or between trips to the local cliff. Based on personal experience in a college setting, many beginners can progress from novice to advanced climber in terms of movement skills after a winters practice on the wall. A third group includes those seeking skills in a formal instructional setting who have the goal of working with the groups mentioned above. The number of instructors-in-training will probably increase dramatically in the future as the Outdoor Recreation/Education community responds to the apparent need for trained leaders that has manifested itself in the 1970's and continues into the 1980's.

Climbing wall design follows most logically from the goals of the individuals and groups using the walls. Most novice climbers begin with the concept that success is related to reaching the top of a climb. It is important that these individuals succeed in their first efforts, particularly if they are part of a challange/growth program. Once these individuals succeed based on their internal definition, they will be ready to try more challenging climbs and to learn new meanings of success. A minimum goal for design of a climbing wall,then, is that most climbers of average balance, as well as arm and finger strength, should be able to reach the top of the wall. This means that the easiest wall to construct, a vertical wall, must have very large hand- and foot-holds. The failing of a vertical design with large holds, is that novices will quickly outgrow the

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wall design, not be challanged further, and grow bored lessing further learning opportunities.

After a few sessions on a climbing wall, most climbers become interested in duplicating climbing movements encountered on rock climbs if the opportunity is made available to them. The hand and foot-holds on rock cliffs are not haphazaradly or randomly arranged, but are the results of rock composition, internal rock structure, and physical erosion agents such as glaciation, that have acted on them. These physical factors produce a variety of climbing problems that while individually unique, can be grouped into a limited number of types of problems. The types of climbing problems include face, stemming, lieback, jamming and mantle techniques to solve (Peters, 1982).

The solution of the various types of climbing problems can either be a static movement where the climber pauses on each hold, or a dynamic movement where the climber passes without pausing in a controled movement between resting places. Done with fluidity and graceful body movement climbing can be thought as a type of dance. Michael Loughman in his book Learning to Rockclimb (Loughman, 1981) has written a chapter on body movement that helps to clarify this concept. Climbing with emphasis on graceful body movement gives individual expression to a sport that now has thousands of participants. Learning these types of movement is also something that is naturally and readily embraced by the beginner after they have mastered their initial exposure to climbing.

Learning and teaching movement also allows the instructor to extend the challange/growth process. An instructor can naturally lead into the idea that the ***process*** of climbing is important. Starting with the process of cooperation between climbing group members, as in the belayer-climber relationship, the instructor can lead students to understand that the process of reaching a goal is also important. The

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process of movement in reaching the top of a climb can serve as a model for the importance of the process in reaching other real world goals. A second goal of designing climbing walls is to provide climbing problems that realistically represent the unique geologic environment of real rock cliffs and that lend themselves to solution by the graceful body movements that are part of the process of climbing. This is not to deny that some climbing problems must be solved by rather inelegent awkard movements, but rather emphasizes an ideal. A coorelation of this goal is that climbing problems require the correct application of specific physical techniques used in conjunction with intellectual problem solving aabilities while the climber retains control over his/her fear of failure.

A Three-dimensional Climbing Wall

Artificial climbing walls can best meet the goals stated above if they are three-dimensional, providing corners and inclined slopes as well as vertical surfaces. One of the problems that arises if a wall is to be constructed indoors is that the possibilities for three-dimensional construction is usually limited due to space limitations. A climbing wall that meets these goals and solves the space problem is described below. This wall was designed and constructed at Unity College in Maine to support an Outdoor Recreation Bachelor's degree program. This wall allows novices as well as climbers of advanced abilities to meet their personal goals. Types of movement possible on the wall include stemming, mantling, face climbing, and liebacking. Degree of difficulty range from easy to difficult. The wall required about $1000 for materials and many hours of volunteer labor.

The wall is composed of readily available 4' x 8' x 3/4" plywood panels with oak (nonsplintering) handholds bolted to the panels. The

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panels in turn are screwed into a wooden framework attached to a concrete block wall by means of expansion (lag) bolts. The wall is three panels (12 feet) wide and three panels (24 feet) high. In a closed position, the wall is protected by safety doors and extends approximately 8" onto the surrounding floor space. The wall is situated behind the college basketball court and does not interfer with the court or its out-of bounds area when closed.

The uniqueness of the wall lies in the fact that the right-hand side of the wall swings out to form a braced 70 degree slab . An additional triangular-shaped set of doors fills the space between the vertical portion of the climbing wall and the 70 degree slab to form a corner. On the left-hand top panel is an overhang that also serves as a platform for rappeling. Belaying for the wall is done 'slingshot' fashion using the floor anchors and an overhead iron bar fastened through the concrete block gymnasium wall.

Most of the interest in the climbing wall lies in the 70 degree slab and the corner formed with it. This is where both the easiest and hardest climbing problems lie. The relatively small oak hand and foot-holds were placed one-by-one to duplicate climbing moves that the author had encountered on rock climbs and the routes created were color-coded. Due to the inclined nature of the slab, strength is required to move only from hold-to-hold and a climber can stand in balance while figuring out the next portion of the climbing problem.

Novices are instructed to use any and all handholds to obtain their goal of reaching the top of the wall. After a few successful climbs of the slab many of these novices attempt and climb the color-coded routes. The non-random placement of holds on the color coded routes creates problems that can most easily be solved by graceful climbing movements. The rules of using the color-coded routes are explained as a game where the participant can use only the hand and foot-holds of a given color and the

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friction of the inclined slab. In this game, the edges of the wall and differently color-coded hand and foot-holds are out-of-bounds. Participants are invited to play a particular color game or to make up a color game of their own, evolving the rules as they proceed. In this way participants are free to experiment and a sense of failure is avoided if a particular movement is too difficult for a climber at that time. In practice, novices learn rapidly, enjoy themselves, and quickly focus on the process of climbing as a goal in itesif. After working through the established color-coded routes, climbers have found recreation and challange by eliminating some of the handholds from a given color-coded route or by finding new combinations of hand-holds to creat new routes. These new routes are then color-coded giving individuals the pride of recognized ascents and new challanges are created for all participants.

The corner formed between the inclinded 70 degree slab and the vertical wall is of special note. Novice climbers often have a difficult time learning to rely on balance over their feet rather than arm strength. The corner routes do not yield easily to solution using arm strength but force the novice to rely on foot movements, opposition techniques, and leg strength to complete the climb. As such, it is an excellent tool for teaching about balance over the feet which is the foundation of climbing technique.

The vertical portion of the climbing wall emphasizes arm and finger strength although the level of difficulty, in the sense of climbing movement, ranges from easy to moderate. Balance, of course, plays a role in this climbing but the novice is so demandingly engaged in simply holding on that it is difficult to teach about balance on this portion of the wall. Its main function, after the challange of the first ascent is attained, is to allow climbers to tone their arm strength.

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The climbing wall at Unity College in Maine is operated by numerous individuals in the various components of the Outdoor Recreation Balachor's degree program. These individuals may be working with participants from group homes through the Outdoor Recreation Extension Service, participants from classes such as Rock Climbing, Mountaineering, or Leaadership; or participants from the Alpine Club or college dormitaries for recreation purposes. The large number of individuals operating the wall has resulted in the need to establish standardized proceedures. Knowledge of safe operation of the wall is established by means of internal certification based on a certification manual and test (Cinnamon, 1982). Certification is maintained by supervisory observation, refresher courses, and repreated operation of the wall. The certification proceedures allow safe use of the wall by a large number of individuals and results in very frequent use of the wall by the Outdoor Recreation community.

In summary, artificial climbing walls are an excellent way to introduce the individuals belonging to groups to essential cooperation and personal body movement skills. Individuals can acheive success by attaining preconceived goals and learning to focus on and to enjoy the processes involved in reaching a goal. Thoughful climbing wall design can provide enhanced learning and teaching opportunities in both one time users and in resident populations.

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